

Why Can Mauritius Export Manufactures and Ghana Not?

Francis Teal

1. INTRODUCTION

THE issue as to how sub-Saharan African countries can enter the market for manufactures is one of the most important policy issues facing governments in Africa. There are at least four views as to the reason for the low levels of manufactured exports from the continent. The first is that Africa's low levels of skills and relative abundance of natural resources ensure that exporting manufactures is unprofitable; Wood (1994), Wood and Berge (1997) and Wood and Mayer (1998). It is possible that natural resource-intensive economies will be able to efficiently export the goods in processed form, essentially if transport costs are sufficiently high to outweigh other cost disadvantages. Owens and Wood (1997) argue for sub-Saharan Africa that this is not the case. They find that processing requires higher levels of skills than are available in Africa. The second view is that African governments have created a high transaction costs environment in which export growth generally has been retarded. In this view, if present policies of openness can be sustained, then export growth, including that for manufactures, can be realised; Collier (1997) and Collier and Gunning (1997). The third view sees the problem as the failure of policy to promote technological capabilities, by which is meant firm-specific learning, which is seen as the basis for a successful process of industrialisation,

FRANCIS TEAL is from the Centre for the Study of African Economies, University of Oxford. The data for the Ghanaian manufacturing sector used in this paper were collected by a team from the Centre for the Study of African Economies (CSAE), University of Oxford, the University of Ghana, Legon and the Ghana Statistical Office, Accra. The surveys were part of the Regional Programme on Enterprise Development (RPED) organised by the World Bank. The questionnaire was designed by a team from the World Bank. The collection of the Zambian data, which is also part of the RPED research programme, was organised by a team from the Department of Economics at the University of Oslo. The Mauritian data were collected as part of a survey organised for the African Economic Research Consortium (AERC) by Dr Rajen Dabee of the University of Mauritius. The author is greatly indebted to Professor Førsund and Dr Dabee for making their data available. The research was undertaken as part of the Trade and Enterprise Research Programme funded by the Department for International Development of the UK. The CSAE is funded by the Economic and Social Research Council of the UK.

Lal et al. (1994). Finally, a view which has its origins in 'new trade' theory, is that the key to successful exporting is the technical efficiency of firms. Such efficiency is determined by policies which encourage innovation, economies of scale, exposure to foreign competition and the availability of new goods; Krugman (1984 and 1987) and Grossman and Helpman (1991). These factors, not comparative advantage defined in terms of resource endowments, determine industrial success.

These explanations are not mutually exclusive. All seek to identify the source of costs to manufacturing firms in Africa that prevent their being internationally competitive. In seeking to test the hypotheses that underlie these views both macro and micro evidence has been used. In this paper we examine the manufacturing sector of two countries which have had very different outcomes for their manufacturing exports, Mauritius and Ghana. In the next sections we present macro and micro evidence for the growth of manufactures in sub-Saharan Africa to set these two countries in context. It is shown that Ghana is among the poorest performers in terms of manufacturing exports while Mauritius is, by far, the most successful economy in sub-Saharan Africa. In Section 4 data for firm performance in Ghana and Mauritius are used to show which elements of the above explanations assist in understanding why Mauritius can export manufactures and Ghana cannot. A final section concludes.

2. EXPORTS OF MANUFACTURES FROM AFRICA: MACRO EVIDENCE

The choice of countries presented in this section – the Cameroon, Ghana, Kenya, Mauritius, Zambia and Zimbabwe – is dictated by the availability of both micro and macro information on the performance of manufacturing exports.¹ The micro evidence relates mostly to the period of the early 1990s. In this section we review the macro evidence on the growth of manufactured exports over the period since the mid-1970s. In the next section we review the micro data for the same countries. All the countries which we consider, with the exception of Mauritius, faced acute difficulties in their macroeconomic environment that had important implications for the performance of manufacturing exports.

The longer term comparative macroeconomic performance of the countries, over the period 1970 to 1995, is shown in Table 1. In the first part of the period, 1971–85, the highest rate of growth was achieved by the Cameroon. Three of the countries experienced negative growth rates of income, Ghana, Zambia and Zimbabwe. Of these three only Ghana was able to reverse the poor performance;

¹ There is firm level information for some other countries, Tanzania and Ethiopia are two examples, but these data are not yet in a form which enables comparisons to be made across countries.

TABLE 1

Trend Rates of Growth (Per Cent per Annum) of Real GDP per Capita, Real Exports per Capita and Real Manufacturing Exports per Capita: 1970–85 and 1985–95

	<i>Real GDP per Capita</i>		<i>Real Exports per Capita</i>		<i>Real Manufacturing Exports per Capita</i>	
	1971–85	1985–95	1971–85	1985–95	1975–85	1985–95
Cameroon	4.4	–6.4	8.3	–1.2	1.0	–1.7
Ghana	–2.8	1.3	–10.7	4.4	1.4	5.7
Kenya	1.0	0.0	–3.1	3.1	–8.7	4.0
Mauritius	2.6	4.3	1.7	5.1	10.9 ^a	6.7
Zambia	–2.7	–2.1	–5.1	0.8	–5.9 ^b	15.5
Zimbabwe	–0.5	–0.4	–1.6	–0.3	–6.3 ^c	0.3 ^c

Notes:

^a 1974–85, ^b 1978–85, ^c 1977–85 and 1985–94.

Source: World Bank Data.

Real GDP and Real exports are World Bank constant price series. Real manufacturing exports were obtained by deflating the value of country export in US\$ by the US export unit value price series from the IMF Financial Statistics.

The figures reported in the table are the coefficients of a regression of the log of the series on time.

for Zambia and Zimbabwe there was no improvement while for the Cameroon the substantial falls in income resulted in a halving of per capita GDP in the decade. Kenya and Mauritius stand out as the two countries with relatively stable growth rates of per capita income. The difference between the two is in the rates. Mauritius grew by between three and four per cent per annum while, on average, the rate of growth in Kenya was less than one per cent. With the exception of the Cameroon all the countries saw an improvement in the growth rates of exports in the second part of the period. Again Ghana is the country which saw the most dramatic turnaround with a trend fall in export volumes of 10.7 per cent being changed to a rise of 4.4 per cent. In Zambia the rapid fall in export volumes was halted but there is no evidence of sustained recovery at the level of aggregate exports. In contrast, for manufacturing exports, Zambia stands out as a relatively successful country over the period 1985–95; real manufacturing exports per capita grew very rapidly, far faster than any of the other countries surveyed. The growth rate for Ghana over this sub-period at 5.7 per cent was very similar to that for Mauritius of 6.7 per cent. While over the longer term, from 1970 to 1995, Mauritius stands out as the only one of the economies presented in the table which successfully sustained growth of income and exports, such averages hide the magnitude of the turnaround achieved by both Ghana and Zambia in their manufactured export growth.

The growth rates shown in Table 1, for Ghana and Zambia, are from very low levels of manufacturing exports. Table 2 shows the percentage of exports which are manufactures, the amount of manufactured exports in US\$ and, to place the figures in context given the very different population sizes of the countries, the

TABLE 2
Manufactured Exports: 1980–95

<i>Country (Means)</i>	<i>Percentage of Exports which are Manufactures</i>		<i>Manufactured Exports (Millions of US\$)</i>		<i>Manufactured Exports per Capita (US\$)</i>	
	1980–90	1990–95	1980–90	1990–95	1980–90	1990–95
Cameroon	9	13	169	224	15	18
Ghana	9	13	83	147	6	9
Kenya	14	17	174	232	8	9
Mauritius	48	67	352	899	341	823
Zambia	6	16	70	132	9	16
Zimbabwe ^a	33	34	492	573	56	56

Note:

^a Zimbabwe is 1980 to 1994.

Source: World Bank Data.

per capita figures.² For only Zimbabwe and Mauritius are manufacturing exports a significant proportion of exports, 33 per cent in the case for Zimbabwe and 53 per cent for Mauritius (on average over the period 1980–95). In terms of exports per capita Mauritius is by far the most successful economy with export values over the period 1980 to 1995 rising from US\$341 to US\$823. A comparison of Tables 1 and 2 shows the nature of the rapid growth in manufactured exports which has occurred in Ghana and Zambia. Comparing the decade of the 1980s with the period 1990–95 both these countries witnessed a very substantial rise in per capita manufactured exports but from such a low level that in Zambia, where the rise was a near doubling, per capita exports at US\$16 were negligible compared to the Mauritius figure, over that period, of US\$823.

Table 3 presents the rates of inflation, the rates of depreciation of the real exchange rate and real interest rates from 1980 to 1995 for the countries. All the countries, with the exception of the Cameroon and Mauritius, have in common highly variable rates of inflation. The variation in the change in real exchange rate across time for the countries is even greater. In Ghana real interest rates, measured simply as the difference between nominal rates and the rate of inflation, have moved from substantial negative to substantial positive numbers. All the countries reviewed, with the exception of the Cameroon, saw substantial declines in their real exchange rates from 1980 to 1989. In the case of Ghana and Zimbabwe this continued into the 1990s. It is possible these declines were important in enabling the expansion of manufactured exports to occur that was documented in Table 1.

² The shares shown in Table 2 are derived from World Bank data. These include some elements of processing in manufacturing exports. The shares therefore differ from those given in the work of Wood and Mayer (1998) which will be presented later.

TABLE 3
Macroeconomic Variables

	<i>Rate of Inflation</i> (Per Cent per Annum)		<i>Change in Real</i> <i>Exchange Rate</i> (Per Cent per Annum)		<i>Real Rate of Interest</i> (Per Cent per Annum)	
	1980-89	1990-95	1980-89	1990-95	1980-89	1990-95
Cameroon	8.8	6.8	1.1	-2.2	0	3.4
Ghana	36.7	24.8	-3.5	-1.6	-17.6	7.8
Kenya	11.0	20.4	-2.7	3.6	2.3	4.9
Mauritius	10.1	7.8	-2.3	4.1	2.9	3.3
Zambia	30.8	71.7	-1.4	1.4	-10.5	-47.6
Zimbabwe	11.9	22.9	-3.0	-2.1	-3.4	1.6

Definitions and Sources:

Rates of inflation are derived from the CPI data given in the IMF Financial Statistics. The real interest rate is the nominal interest rates (the deposit rate in IMF statistics) less the rate of inflation. The real exchange rate is defined as:

Domestic CPI/(US export price index multiplied by the nominal exchange rate).

The nominal exchange rate used is domestic currency to the US\$. This is a crude measure of the real exchange rate but it captures the most important aspects of the differences between nominal and real exchange rate movements.

In Table 4 the results of an analysis of the determinants of manufactured exports from sub-Saharan Africa by Wood and Mayer (1998, Table 8) is presented for the countries on which this paper is focusing. The first column is the predicted share of manufactures in total exports. The second column shows the difference between the actual share and that predicted. (The sum of columns [1] and [2] is thus the actual share.) In the second part of Table 4 a similar presentation for the share of processed products in primary exports is given. It will be noted that for all the countries, except Zimbabwe, the predicted share for manufactures is below the actual, in the case of both Ghana and Zambia very

TABLE 4
Predicted Export Composition of Selected African Countries

<i>Country</i>	<i>Shares of Manufactures in</i> <i>Total Exports</i>		<i>Share of Processed Products in</i> <i>Primary Exports</i>	
	<i>Predicted</i>	<i>Actual Minus</i> <i>Predicted</i>	<i>Predicted</i>	<i>Actual Minus</i> <i>Predicted</i>
Cameroon	18	-10	14	1
Ghana	33	-30	19	9
Kenya	26	-5	19	1
Mauritius	80	-18	38	-30
Zambia	16	-12	21	76
Zimbabwe	20	14	16	4

Source: Wood and Mayer (1998, Table 8, p. 38).

substantially so. For processed products the actual share is above the predicted for all the countries except Mauritius. For Ghana the actual share of manufactured exports (i.e. excluding processing) was 3 per cent compared with a prediction of 30 per cent, while its actual level of processed products at 28 per cent was 9 per cent higher than the predicted one. The variables used to generate these predictions are the proportions of skilled labour to natural resources in the economies. It is clear that Ghana's manufacturing performance is poor relative to what would be predicted on the basis of its factor endowment, while it exports more processed primary products than it 'should' on the basis of an analysis of its comparative advantage assessed in terms of skilled labour and natural resources. Among the countries reviewed Ghana and Zambia perform poorly relative to the others.

The analysis of this section has shown that rapid export growth of manufactures from Africa has proved possible in the 1990s. However, the level remains very low, both absolutely and relatively to what would be predicted by an analysis of comparative advantage. It appears there remains a lot of explaining to do. In the next section we consider the micro evidence.

3. EXPORTS OF MANUFACTURES FROM AFRICA: MICRO EVIDENCE

In this section the micro evidence is reviewed. In Tables 5 and 6 evidence presented in Bigsten et al. (forthcoming) is extended to include information on Mauritius and Zambia. The data for Mauritius are drawn from a small survey conducted in 1994.³ For the other countries the surveys were conducted over the period 1991 to 1995. The data presented in this paper are taken from the first rounds of those surveys.

In Table 5 the export orientation by sector is presented while in Table 6 that by firm size. Export orientation is defined as the percentage of output of the firms that is exported. In Table 5 four sectors are used: food, textile and garments, wood and furniture and metal working, which includes machine manufacture. The table shows the percentage of firms that are exporting and the percentage of their output that is exported. The percentage of firms which were exporters varies greatly between the countries. At one end of the spectrum are Mauritius and Zimbabwe where over half of the firms export. At the other end of the spectrum are Ghana and Zambia with 8 per cent. Within the sectors there are also substantial differences across the countries. In the textile and garment sector the extremes are represented by Mauritius where 67 per cent of firms export and

³ While the sample size is small the findings which will be presented below of the relative success of Mauritian firms is entirely consistent with the much larger data set used by Milner and Wright (1998) to analyse the pattern of growth of the economy.

TABLE 5
Export Orientation: by Sector

		<i>Food</i>	<i>Textile and Garments</i>	<i>Wood and Furniture</i>	<i>Metal Working and Machines</i>	<i>All Sectors</i>
Cameroon	N	32	19	23	42	116
Percentage Exporting		25	26	39	38	33
Percentage Exported		5	31	25	10	11
Percentage Exported if Exporting		0	0	65	27	32
Ghana	N	37	35	34	36	142
Percentage Exporting		0	3	18	11	8
Percentage Exported		0	0.03	84	1	22
Percentage Exported if Exporting		na	25	6	8	8
Kenya	N	32	45	44	47	168
Percentage Exporting		22	16	18	34	23
Percentage Exported		13	4	4	7	7
Percentage Exported if Exporting		60	25	24	21	30
Mauritius	N	2	12	3	18	35
Percentage Exporting		50	67	67	50	57
Percentage Exported		1	65	35	26	39
Percentage Exported if Exporting		2	98	53	52	68
Zambia	N	44	45	30	34	153
Percentage Exporting		5	13	7	6	8
Percentage Exported		1	3	3	0.04	2
Percentage Exported if Exporting		15	21	48	1	21
Zimbabwe	N	36	72	21	29	158
Percentage Exporting		47	58	38	62	54
Percentage Exported		5	15	8	9	11
Percentage Exported if Exporting		10	27	20	14	20

Source: The data for the Cameroon, Ghana, Kenya and Zimbabwe are based on those presented in Bigsten et al. (forthcoming) where some of their sectors have been aggregated to facilitate a comparison with data from Zambia and Mauritius. The Zambian data are part of the Regional Programme on Enterprise Development (RPED); see von der Fehr et al. (1994). The Mauritian data were collected as part of a survey organised for the African Economic Research Consortium (AERC) by Dr Rajen Dabee of the University of Mauritius. For all the countries except Mauritius, for which there is only one cross-section, the data presented are from the first rounds of the surveys. N is the number of observations.

Ghana where only 3 per cent do so. The other major difference between Mauritius and the other sub-Saharan firms is in the percentage of output that is exported. In Zimbabwe, which is closest to the pattern of Mauritius, it is 11 per cent, about one-quarter the level of Mauritius. The picture captured by the micro surveys is

TABLE 6
Export Orientation: by Firm Size

		<i>Large</i> (≥ 100 <i>Employees</i>)	<i>Medium</i> (≥ 30 and <100 <i>Employees</i>)	<i>Small</i> (<30 <i>Employees</i>)	<i>All</i>
Cameroon	N	24	36	56	116
Percentage Exporting		79	31	14	33
Percentage Exported		30	5	6	11
Percentage Exported if Exporting		38	15	41	32
Ghana	N	15	21	106	142
Percentage Exporting		40	10	3	8
Percentage Exported		12	5	1	2
Percentage Exported if Exporting		31	50	7	28
Kenya	N	36	48	84	168
Percentage Exporting		61	29	2	23
Percentage Exported		20	7	1	7
Percentage Exported if Exporting		33	24	26	30
Mauritius	N	12	10	13	35
Percentage Exporting		92	30	46	57
Percentage Exported		62	11	39	39
Percentage Exported if Exporting		67	37	84	68
Zambia	N	28	43	82	53
Percentage Exporting		25	7	2	8
Percentage Exported		7	1	1	2
Percentage Exported if Exporting		29	7	13	21
Zimbabwe	N	84	33	41	158
Percentage Exporting		77	58	2	54
Percentage Exported		18	5	0.01	11
Percentage Exported if Exporting		23	9	1	20

Source: As for Table 5.

very similar to that observed in the macro data. Mauritius is an outlier within the group in terms of the extent of its manufactured exports. Among the other countries there is diversity around the much lower average level of exports with Zimbabwe and the Cameroon being relatively successful exporters while Ghana, Kenya and Zambia manage very modest levels of exports.

From Table 6 it is clear that in all countries, exporting firms are substantially larger in terms of employment than non-exporting firms. The importance of size has been noted by Berry (1993). This pattern is much less pronounced in

Mauritius than in the other countries but the sample size is small. It is easy to understand why a certain minimum size is necessary for firms to be able to export. There are fixed costs of marketing and costs of access which require a certain scale of operations. On the basis of the evidence presented in Bigsten et al. (forthcoming) this minimum size appears to be firms with 100 employees.⁴

The finding from the surveys is that while most African manufacturing firms do not export, most large firms do. The exceptions are Ghana and Zambia. The failure of large firms to export from Zambia may be due to the extent of state involvement in that country; until relatively recently, however, it clearly cannot account for the failure of such firms in Ghana. The contrast between Ghana and Mauritius across both sector and size is striking. In Ghana exporting is confined to the wood sector where it consists of processing timber products.⁵ This sector is relatively capital intensive within Ghanaian manufacturing. In Mauritius exporting is concentrated in the garment sector which is, by far, the most labour intensive sector. While in Mauritius 90 per cent of large firms export, only 40 per cent of large Ghanaian firms enter the export market. The picture at the micro level closely mirrors that from the macro data. What exporting occurs within Ghanaian manufacturing is in the form of processing; there are virtually no labour intensive manufactures. In the next section we examine whether more detailed information on the firms in the two countries can explain these facts.

4. FIRMS IN GHANA AND MAURITIUS

What do Mauritian firms have that Ghanaian firms do not? Plausible answers to that question include, a better macroeconomic environment, a better trained work force and more efficient firms. We have already shown that the macro environment for Ghana has improved and that in terms of the growth rate for its manufactured exports they were similar to those for Mauritius in the early 1990s. What of firm efficiency and training?

If firms in Ghana are internationally uncompetitive it must be that their wages are too high for their levels of productivity. In Table 7 we present the data for productivity and wage differentials between the two countries. Monthly wages in Mauritius are US\$339 per month and in Ghana US\$56, a differential of six times. If capital costs are the same in the two countries then the issue is whether labour productivity differentials are more than six times higher in Mauritius. There are

⁴ Bigsten et al. (forthcoming) show that for the Cameroon, Ghana, Kenya and Zimbabwe, 71 per cent of firms with more than 100 employees export while for those with from 29 to 100 employees the number is 35 per cent. For firms smaller than 30 only a negligible proportion enter the export market (see their Table 3).

⁵ The aggregation in Table 5 hides this fact which can be seen in Bigsten et al. (forthcoming, Table 2).

TABLE 7
Firm Characteristics: by Sector

		<i>Food</i>	<i>Textile and Garments</i>	<i>Wood and Furniture</i>	<i>Metal Working and Machines</i>	<i>All Sectors</i>
Ghana	N	35	36	35	37	143
Employment		50	19	79	55	51
Monthly Wages		76	36	56	54	56
Value-added/Employee		6,761	1,884	3,935	7,410	5,009
Capital/Employee		8,291	3,829	7,829	9,605	7,393
Education		9.0	9.2	9.5	9.6	9.4
Mauritius	N	2	13	3	18	36
Employment		136	169	200	96	133
Monthly Wages		257	384	303	322	339
Value-added/Employee		41,405	13,396	94,955	43,264	36,682
Capital/Employee		55,984	3,284	7,573	30,784	20,319
Education		10.3	10.2	6.8	10.5	10.0

Notes:

Employee is Number of Employees, Monthly Wages is in US\$, Value-added and Capital are measured in purchasing power parity US\$, Education is in Years.

Sources: As for Table 5.

two ways of investigating the differences in underlying productivity between the two countries. One is to compare the two production functions, the second is to use a dummy variable in a pooled regression. Both methods will give similar results if the underlying form of the production function is the same in the two countries. In Table 9 individual and pooled regressions for the determinants of productivity in the two countries are presented.

The measure of productivity is value-added per employee where value-added has been converted to purchasing power parity US dollars so it can be compared across countries. We consider three factors determining value-added: labour, physical capital and human capital. Labour is simply the total number of employees in the firm. Physical capital is the replacement value of capital to the firm valued at purchasing power parity dollars. Human capital is measured as the average years of education of workers in the firm.

The equations presented in Table 9 show that the determinants of productivity are similar across the two countries. The coefficients on physical capital are similar and the human capital variable is not significant for either country. The underlying productivity differential between Ghana and Mauritius is 3.8 times [$\exp(1.57) - 1$]. In round numbers Mauritian firms are four times more efficient than those in Ghana. However, average wages are six times higher in Mauritius so firms in Ghana, even with these low levels of productivity, should be more

TABLE 8
Firm Characteristics: by Size

		<i>Large Firms</i> (≥ 100 Employees)	<i>Small Firms</i> (<100 Employees)	<i>All Firms</i>
Ghana	N	20	123	143
Employment		231	21	51
Monthly Wages		100	47	56
Value-added/Employee		11,067	4,024	5,009
Capital/Employee		22,778	4,891	7,393
Education		11.1	9.1	9.4
Mauritius	N	12	24	36
Employment		330	35	133
Monthly Wages		279	369	339
Value-added/Employee		37,898	36,075	36,682
Capital/Employee		12,885	24,036	20,319
Education		11.1	9.5	10.0

Notes:

Employee is Number of Employees, Monthly Wages is in US\$, Value-added and Capital are measured in purchasing power parity US\$, Education is in Years.

Source: As for Table 5.

profitable for their owners. There is no evidence for either country of increasing returns to scale, i.e. controlling for the capital/labour ratio large firms do not have higher labour productivity than small ones. However, as noted in the previous section, the evidence from across sub-Saharan Africa suggests that firms can only export if they reach a minimum size of 100 employees. The data in Table 8 show that for these firms the wages in Mauritius are only three times those in Ghana. Thus the Ghanaian firms which are large enough to enter the export market firms have higher unit cost than those in Mauritius: productivity in Mauritius is four times higher and wages are only three times higher than in Ghana.

5. CONCLUSIONS

We have examined four possible explanations for the poor performance of manufactured exports from Ghana relative to Mauritius, all related to arguments why underlying costs will be higher in Ghana than in Mauritius. The argument that these higher costs result from the low ratios of skilled labour to natural resources led to a predicted manufacturing export share substantially higher than that observed (33 rather than 3 per cent). If such costs play a role they are a far from complete explanation for poor Ghanaian performance. Macroeconomic

TABLE 9
The Determinants of Productivity

	<i>Mauritius</i>	<i>Ghana</i>	<i>Pooled</i>
Constant	8.29 [3.3]**	5.25 [7.1]**	6.86 [9.5]**
Ln (Capital/Employee)	0.28 [2.3]*	0.35 [6.9]**	0.37 [8.4]
Ln (Employment)	-0.01 [0.1]	0.18 [1.8]	0.12 [1.5]
Ln (Education)	-0.34 [0.4]	-0.29 [0.8]	-0.27 [0.9]
Food	0.22 [2.3]	0.44 [1.8]	0.39 [1.8]
Textile and Garments	-0.67 [1.5]	-0.01 [0.02]	-0.43 [1.3]
Wood and Furniture	0.48 [0.6]	-0.01 [0.04]	0.05 [0.2]
Ghana Dummy			-1.57 [6.1]**
Adjusted R^2	0.27	0.37	0.53
N	36	139	175
White χ^2 (df)	18 (18)	27 (20)	23 (28)

Notes:

Dependent Variable: Ln (Value-added/Employee in PPP US\$)

The data presented for Ghana use only the third wave of the survey.

* Indicates significance at the 5 per cent level, ** at the 1 per cent level.

policy has improved and in the 1990s the growth rate of Ghanaian manufactured exports was similar to that of Mauritius. It needs, however, greatly to exceed that of Mauritius if the gap between the economies is to be closed. The final two explanations reviewed in the introduction focused on differences in technical efficiency across the firms. This has been shown to be very important – Mauritian firms are four times more efficient than those in Ghana. Their average wages are six times higher so, while differential efficiency is important, it cannot be the whole explanation. The data suggest there is a strong link within Ghana between wages and firm size. For firms able to enter the export market, which the data show needs to be those with more than 100 employees, wages are only three times higher in Mauritius while productivity remains four times higher. These results provide important insights into the reasons for the poor export performance of Ghanaian manufacturing firms relative to those in Mauritius. For those firms able to export, wages are too high to enable the firms to compete given the efficiency at which the firms operate.

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